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The National Security Dilemma

by Marshall K. Wood

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The following article is a condensation of an address delivered to the Seventh International Meeting of the Institute of Management Sciences, New York City, on October 20, 1960. The full address will be published in a forthcoming issue of Management Science.

THE 1960s WILL BE a decade of unprecedented military peril for the United States and the world. This peril stems from the advent of ballistic missile weapons systems which tremendously increase the already great advantage of offense over defense, and from the existence of authoritarian, revolutionary, and expansionist Communist states able and willing to exploit these weapons.

This peril has produced a consensus on the need to strengthen U.S. national security programs. But there is as yet no consensus on the objectives of U.S. national security policy or how to attain them. This article attempts to contribute to the development of such a consensus by outlining some of the major problem areas and possible solutions.

Deterrence. U.S. security policy is based on the concept of deterrence. This requires the maintenance of forces which any enemy will believe able to deliver crushing retaliatory blows *after sustaining a surprise attack*.

U.S. strategic striking forces are composed largely of manned bombers. Most of them are deployed on about 50 airfields in the continental United States, with a fraction on rotational assignment to advance bases and a handful on airborne alert. There are also a few dozen Intermediate Range Ballistic Missiles (IRBMs) on advance bases and a handful of Atlas Intercontinental Ballistic Missiles (ICBMs) on a few U.S. bases. The Soviet Union's strategic striking force comprises a smaller number of bombers, a large number of ICBMs, and a much larger number of IRBMs.

A premeditated attack on the United States would probably be initiated by a surprise attack with ballistic missiles against the U.S. retaliatory forces. IRBMs would probably be used against most of the advance bases, while the 50-odd U.S. bases could be attacked with either ICBMs or, possibly, with submarine-launched missiles.

U.S. Strategic Air Command (SAC) doctrine provides for maintaining one-third of the force on ground alert, ready to launch in 15 minutes. If the Soviets thought that one-third of the U.S. force would be launched, they would probably be deterred from attack. But the launching of this ground alert force is wholly dependent on the timely receipt of warning.

Attack Warning. The advance bases, in general, cannot have an early warning system because they are too close to Communist bloc territory. U.S. bases are dependent for attack warning on the Thule, Greenland unit of the Ballistic Missile Early Warning System (BMEWS). This should provide about 15 minutes warning of missiles launched

• ".... Throughout our history as a nation, we have grown accustomed to looking upon War as one thing and Peace as another—and adjusting our national policies accordingly.

"Now we find ourselves confronted with a situation that is neither full War nor full Peace but Cold War—or Hot Peace. . . . Cold War may last for generations—a throwback timewise to the days of the 14th and 15th Centuries when the Hundred Years' War and the Wars of the Roses raged on seemingly without end.

"Because of the permanency of the crisis and the complexity of the problems inherent in it, this Cold War situation calls for a new approach to over-all, long-range planning. We must establish far-sighted objectives and plans which will not be affected in a major way by short-term considerations."

An excerpt from an address by John L. Burns, President, Radio Corporation of America, entitled "The Businessman and National Security," delivered at the 50th Anniversary Conference, Harvard Business School Association, Boston, Massachusetts, September 6, 1958.



against the United States from the central portion of the Soviet Union.

But missiles could be launched from eastern Siberia or southern Russia which would pass beneath the line of sight of the Thule radar.¹ The second and third units of the BMEWS system, in Alaska and England, which are scheduled for completion in 1961 and 1962, respectively, will plug these gaps. Even after the completion of the BMEWS system, missiles could be launched against the United States from western China or Tibet on trajectories which would pass over the BMEWS radar beams beyond their maximum range and thus escape detection.

MIDAS satellites could provide warning shortly after launch of any type of ballistic missile, but the development of a complete MIDAS system appears to be several years away. And it is quite possible that the Soviets will be able to shoot down satellites by then. Another new warning system, Teepee, could provide warning shortly after launch by radar signals reflected back from the ionized gases produced by a missile exhaust, but this system too seems to be several years in the future. Thus, we cannot be certain, now or for some years to come, that we would get enough warning of a ballistic missile attack to permit the launching of the ground alert force.

Vulnerability of Retaliatory Forces. We do not have in being or under construction any active defense against ballistic missile attack. Indeed, it is not yet certain that any reasonably effective ballistic missile defense system will ever be feasible. Thus, the chances of survival of missiles and bombers on the ground are dependent only on the accuracy, reliability, and size of the attacking missile force.

The accuracy of ICBMs has strikingly increased in the last year or two so that any which detonate in the target area are virtually certain to cripple "soft" targets, such as bombers or above-ground missiles. The key operational factor is reliability: the percentage of missiles ready to fire which would actually detonate in the target area. If the attacker expects 70 percent reliability, he must attempt to fire three missiles per target to get 97 percent assurance of success. If he expects 90 percent reliability, two missiles per target would give him 99 percent assurance of success. General Power, the SAC commander, said last Spring that if the Soviets had 300 missiles, of which only 150 need be ICBMs, they could virtually wipe out our deterrent force. That would allow about three missiles per retaliatory base, world-wide.

The effectiveness of U.S. forces surviving a surprise attack would be sharply reduced by the fully alerted, high quality Soviet bomber defense system; present bomber defense systems are highly effective against *small* attacking forces. On the other hand, much of the U.S. bomber defense system would probably be crippled by any attack on SAC because of its co-location on SAC bomber and tanker bases, so that Soviet bomber forces would meet relatively ineffective opposition.

The Soviets might follow up their initial missile attack on U.S. retaliatory bases with an attack of several hundred bombers against U.S. cities a few hours later. While this bomber force approached the United States, Mr. Khrushchev would be in a good position to blackmail the President into recalling the surviving U.S. bombers, since he could threaten credibly to destroy several U.S. cities for every Soviet city attacked. Such a threat could also be effective against surviving U.S. naval and tactical air forces. With the entire U.S. population as a hostage, Mr. Khrushchev might expect such a threat to be effective.

Soviet Capabilities. About a year ago, Joseph Alsop quoted U.S. national intelligence estimates as crediting the Soviets with a capability of producing 100 ICBMs by 1960, 500 by 1961, 1,000 by 1962, and 1,500 by 1963. About the same time, Secretary of Defense McElroy said that the Soviets would probably have about three times as many ICBMs as the United States in the early 1960s. Based on subsequent press reports of U.S. programs, that would give them roughly 400 by 1962. Last Spring it was indicated that new estimates which attempted to reflect actual Soviet programs instead of capabilities, gave lower figures, especially for ready missiles on launching sites. Presumably the estimates of missiles on launching sites were based on information from the U-2 overflights. But we can hardly be sure that the U-2 overflights observed all Soviet missile launching sites. It is also possible, as Mr. Khrushchev alleges, that Soviet missiles, or some of them, are designed for use with mobile launchers which might not have been observed.

Intelligence estimates of Soviet ICBM strength are inevitably subject to considerable uncertainty, and we cannot be sure that the Soviets do not already have, or will not soon get, enough to seriously consider a surprise attack on the United States. The immediacy of this threat was attested by the President's action in ordering a SAC alert at the time of the abortive summit conference last May.

Reducing the Vulnerability of U.S. Forces. The only way to reduce the vulnerability of U.S. retaliatory forces quickly is to increase the size of the airborne alert force. An airborne alert force of about 200 is reported to be feasible, probably within about a year, and should be a fairly effective deterrent. Maintenance of such a force should put increased pressure on the Soviets to agree on arms control measures. Such a step would result in wearing out the bomber force fairly rapidly and might even increase international tension somewhat. Nevertheless, it seems a necessary stopgap measure.

New deterrent weapons systems now being developed or produced are mostly designed to be less vulnerable to surprise attack. New sites for the Atlas and Titan ICBM systems are "hardened" underground launching complexes, designed to resist the effects of nearby weapon detonations. A similar philosophy will be followed in future sites for the Minuteman ICBM system. The effectiveness of this procedure depends on a delicate statistical balance between the resistance of the launching site to blast and shock and the assumed warhead yield and accuracy of enemy weapons.

No one knows just how much blast pressure and shock such sites can withstand and still perform their function, but it is probably in the range from 100 to 500 pounds per square inch (p.s.i.). A single ICBM with a 10-megaton warhead and an average error of 1 mile would have a 60 percent chance of producing more than 100 p.s.i. at the aiming point and a 25 percent chance of producing more than 500 p.s.i. If the average error were half a mile, a 10-MT ICBM would have about a 90 percent chance of producing more than 100 p.s.i. at the aiming point and a 60 percent chance of producing more than 500 p.s.i. With several weapons per target, these probabilities would be much higher.

The Soviets are clearly ahead of the United States in rocket thrust and are thus in a position to use large multi-megaton warheads on their ICBMs. The miss distance of U.S. ICBMs in test firings was reduced from an initial expectation of 5 miles to 2 miles in 1959, and is subject to continuing improvement. The Soviets have also demonstrated high accuracy. Thus, we do not know whether

missile sites can be made hard enough to have a high probability of surviving attack.

Vulnerability can also be reduced by mobility, as in the submarine-launched Polaris IRBM system and the rail-launched version of the Minuteman ICBM system. Both of these systems promise progress in reducing vulnerability, but each also has its problems.

The Polaris has a relatively short range (1200 miles) and must be launched close to enemy territory. The launching submarines would certainly be counterattacked as soon as they had fired their first missile. It is doubtful if they could move out of range of nuclear weapon effects during the flight time of a short-range air-to-surface or surface-to-surface missile. Thus, it seems possible for the Soviets to create a defense force which could destroy Polaris submarines as soon as each had fired its first missile.

The problems associated with the mobile Minuteman are less clear, since it is not so far along in development. However, it seems doubtful that a large number of such special trains can be kept in continuous random movement without completely disrupting normal rail traffic. Also, they will be readily recognizable and therefore fairly easy for the enemy to keep track of and to attack, since they would be vulnerable to weapons effects at considerable distances.

Third Party Provocation. Ballistic missile submarines are unique in that they can be employed without disclosing their national origin. They thus are weapons against which deterrence will be ineffective as soon as more than one nation has them. When and if Red China, for example, acquires ballistic missile submarines, it will be in a position to provoke a general war in which the United States and the Soviet Union might destroy each other, leaving China relatively unscathed. To do this, Red China need only launch a few missiles at key targets in both the United States and the Soviet Union. Since it would be impossible to determine the nationality of the submarines which launched the missiles, the United States and the Soviet Union would each be likely to assume the other responsible and to retaliate against the other.

This possibility is emphasized by the ideological schism between the Soviet Union and Red China, recently papered over but surely not forgotten. Earlier this year, Mao Tsetung and his principal lieutenants insisted that war with the capitalist states is inevitable and that China would not shrink from such a war even though it might suffer 300 million casualties. Nuclear weapon technology is now widely understood and there is little question that Red China can build nuclear weapons whenever it wishes to devote the necessary resources to it. Mao announced some time ago that Red China had nuclear submarines under construction and Khrushchev has said that Soviet aid to China has included rockets. Thus, we must expect that Red China will have ballistic missile submarines before many years have passed.

I think we will have to anticipate the time when the United States and the Soviet Union will find it to their mutual interest to agree to prohibit the use of ballistic missile submarines and to enforce this ban by prohibiting the use of any submerged submarines on the high seas, except in accordance with rigid international inspection and control.

War by Accident or Miscalculation. President Eisenhower emphasized the danger of war by accident or miscalculation in his recent address to the UN General Assembly. This risk results in part from the extreme sensitivity of our present retaliatory system to the amount of warning.

The *minimum* warning time which the SAC ground alert bombers and missiles require to get off the ground is just equal to the *maximum* warning time which we can expect to get from the BMEWS system. The problem is even worse with respect to the early, soft ICBMs and IRBMs. These cannot be launched subject to recall as can the bombers but must wait for an irrevocable decision to strike. A few minutes delay in reaching the President, or a few minutes delay on his part in deciding what action to take, could deny us the chance to use these weapons at all. For the IRBMs, a binational political decision—by the United States and the host country—is required. This is hardly likely in a few minutes.

This situation puts an impossible burden on the President to act immediately on the basis of any warning, no matter how ambiguous. Ambiguous warnings of many kinds are possible: from intelligence, from satellites, space rockets, accidental firing of ICBMs, or from human or mechanical errors. It is an unstable situation resulting in a risk of accidental war which we need to reduce as rapidly as possible without increasing the risk of premeditated surprise attack.

There is also the chance that a limited war might grow into a general war by successive use of small tactical nuclear weapons, then larger tactical weapons, and finally, strategic thermonuclear weapons. The nation which is losing a limited war will always be tempted to recoup by the use of more powerful weapons. To reduce these risks, we clearly need to redouble our efforts to achieve graduate reduction of nuclear armaments under adequate controls.

Arms Control. There is no way now known or conceived of by which the destruction or dismantling of nuclear weapons could be verified and controlled without a foot-by-foot search of the entire territory of all nations which may possess them. Nuclear weapons now exist in large numbers, in small, easily concealed packages. To find them would require an army of inspectors with a degree of freedom of movement which the Communist bloc states certainly *would* not allow and probably *could* not allow without jeopardizing their political control.

We must then pin our hopes on controlled reduction of the *vehicles for delivering* nuclear weapons. We may be able to verify and control an agreement to reduce and eventually eliminate nuclear weapon delivery vehicles with relatively less elaborate procedures, to which the Soviet Union and Red China might agree. Such inspection procedures would not be able reliably to detect small-scale evasions, but should be able reliably to detect large-scale evasions. Can we live with this kind of a situation?

We are probably going to have to live with an equivalent level of hazard in any event. Nuclear weapons do not have to be delivered in specially built vehicles; they can be dumped out the doors of commercial aircraft, concealed in tramp steamers, delivered by truck, or even by hand in suitcases, for small yields. These methods of delivery would constitute major and important threats if there were no better means and little retaliatory capability. These methods could kill tens or even hundreds of millions of people. Even if we could insure that all nuclear weapons were destroyed or dismantled, there would be no way to insure against clandestine remanufacture.

Shelter. The United States can reduce the hazard from all these causes by an order of magnitude by undertaking a nationwide program of shelter construction. An adequate program for the United States would cost from \$3 to \$5

billion per year for a period of eight to 12 years. This is about what we have been spending for defense against bomber aircraft. Our bomber defense system is not yet completed, but it is already obsolescent. A shelter program would be far more effective in reducing casualties and would be subject to a much slower rate of obsolescence. In fact, it should have a much longer useful life than any kind of military equipment we now buy.

A shelter program should provide fallout shelter for areas where the risk of blast damage would be low, and blast shelters in areas close to likely targets. Good blast shelters can be built for about \$75 per person in large group shelters, and for about \$200 per person in individual family shelters. For built-in individual family shelters, using borrowed money and amortized in 10 years, the cost would be about \$25 per year per person, or a little over 7¢ a day per person. In areas where only fallout protection is needed, the cost would be less.

Such shelters would not provide complete protection, but would greatly increase the probability of survival. They would provide complete protection from air burst weapons and protection to within about 1½ miles from ground zero of 10-MT surface burst weapons. Without shelters, most people closer than 6 miles from ground zero would be casualties and there would be some blast casualties out to about 15 miles. Construction of such shelters should reduce total casualties from an attack by at least 90 percent.

But perhaps the most important point is that if we have a good shelter program, we can afford to agree to an arms control plan that provides for good, but not perfect, control and inspection. Without it, the United States will probably feel compelled to insist on a level of assurance in inspection and control which the Soviet Union and Red China will not accept. If we fail to agree on arms control, the instabilities previously discussed are almost sure to lead to a nuclear war sooner or later. The longer such a war is deterred, the more catastrophic it would be.

UN Police Force. It is imperative that the capability to cope with non-nuclear conflicts be augmented concurrently with, or preferably in advance of, the reduction of nuclear delivery vehicles. As long as the great powers retain a substantial nuclear delivery capability, it is vital to avoid their direct involvement in local conflicts which could spread to involve the prestige and vital interests of both the Western alliance and the Communist bloc.

The best means of avoiding this is by strengthening the UN's capability of dealing with local conflicts. The Secretary General has proposed, and the United States has endorsed, the creation of standby arrangements for UN forces, including the maintenance by member states of contingents earmarked and maintained in readiness to participate in UN emergency forces when needed.

The nuclear powers should not participate directly in such UN forces; but the special, technical, industrial, and economic capabilities of the nuclear powers could be well utilized to provide the logistic support for such UN forces. The United States has already offered to provide substantial air and sea transport for the support of such forces.

But such multinational forces need to be organized and jointly trained in advance of an emergency in order to work out command, communication, and logistic support procedures. This could be done while still maintaining separate national control prior to an emergency, if bases were available, under UN control, on which such national contingents could be assembled for extended joint training.

(Continued on page 8)

—The People of NPA—



Paul H.

Nitze

Whit Keith, Jr.

Paul H. Nitze, NPA International Committee member, has been president of the Foreign Service Educational Foundation since 1953 and is an associate of the Washington Center of Foreign Policy Research of the School of Advanced International Studies of the Johns Hopkins University.

Mr. Nitze, who was graduated cum laude with a B.A. degree from Harvard University in 1928, began his career with Dillon, Read & Company, investment bankers, in New York, 1929-37. In 1938, he founded P. H. Nitze & Company, Inc., an investment banking firm, and the following year became vice-president of Dillon, Read & Company.

When World War II began, Mr. Nitze launched into a long career in government service. First, as financial director of the Office of the Coordinator of Inter-American Affairs, 1941-42, he later became chief of the Metals and Minerals Branch of the Board of Economic Warfare, 1942-43. He has served as director of the Foreign Procurement and Development Branch, Foreign Economic Administration, 1943-44; vice-chairman, U.S. Strategic Bombing Survey, 1944-46; deputy director, Office of International Trade Policy, State Department, 1946-48; and as deputy to the Assistant Secretary of State for Economic Affairs, 1948-49.

In August 1949, Mr. Nitze was named deputy director of the State Department's Policy Planning Staff and later served as its director from 1950-53.

On August 31, 1960, Senator Kennedy appointed Mr. Nitze to head a four-man post-election advisory group on national security policy.

The author of many publications in the field of foreign policy, Mr. Nitze has written articles for *Foreign Affairs* and *The New York Times Magazine*, to name only a few. In 1960, he is a contributing editor to *Christianity and Crisis*.

In July 1946, he was awarded the Medal for Merit by President Harry S. Truman "for extraordinary fidelity and exceptional meritorious conduct."

The Ethical Challenge of Modern Administration

IN A HIGHLY ORGANIZED society, such as the United States today, administration has become one of the most pervasive realities of modern life. To strike a happy balance between the managers and the managed within the unique framework of a democratic society, to conduct our complex affairs effectively and yet without distorting our values, to harmonize our practices with our American professions—this is the great ethical challenge of modern administration. Ordway Tead, vice president of Harper & Brothers and editor of social and economic books of that company, discusses this challenge in an article in the October issue of *Advanced Management*.

Administration, in the context of Mr. Tead's article, is equated with management and with executive labors of a general, high-level, directive nature. Every facet of our lives is, in one way or the other, supervised by administrators. Government, business, industry, schools, public institutions, philanthropic agencies—all these organizations have certain common problems of basic function: striving for the attainment of a designated goal; financial aspects of the operation; external activities such as selling, information or public relations; internal activities such as personnel management; and, finally, coordination of several functional activities for the fulfillment of the avowed organizational purpose.

Broadly speaking, there are two types of managerial activity: technological implementation of the explicit purpose of the organization and promotion of the effective performance by personnel. It is in this personnel phase of management that the ethical problem becomes explicitly posed.

In the American democratic society the autonomy of the individual, his right to be an end in himself, takes precedence over ends of all organizational dominance. Any other interpretation would be a perversion of those values for which American society stands today. On the other hand, in any formal organization, limitations of individual freedom through responsibilities of work and functional usefulness are clearly recognized. To keep ethical sensibility adequate to complexities of the job at hand, to square organizational objectives with individual, self-evident human goals—such is the ethical mandate upon modern administrators. "The enrichment of the human situation is the consummation of administrative power," according to Mr. Tead.

Beyond the readily identifiable and important field of personnel administration, there is a complex of broader inter-relationships. Mr. Tead discusses briefly each of the related phases of management with which all administration must be dynamically concerned.

Leadership, based on persuasive appeal and stimulation, not on authoritarianism, that is, democratic leadership, is "at the heart of ethical accountability." In the democratic concept, the role of the leader has to do with loyalty to purposes rather than with passive loyalty to the sole alternative presented by authoritarian leadership. Truly democratic leadership succeeds in establishing a valid alliance for common purpose.

Authority should be exercised in such a way as to insure long range beneficent effects on individual employees in strict correlation with sound corporate results. To play its proper ethical role, authority should stem from "total participative outcome of consultation with appropriate sources of wider knowledge."

Communication to be successful must be a two-way process. It can be measured soundly only by the responses it evokes. It should be a "feedback" to the communicator, rather than a vehicle of his telling others what he thinks. Communication is important ethically because it involves alterations in thought and conduct in those who are virtually required to listen. Good communication is a reciprocal process which cannot be left to mechanical devices, but can only be the product of immediate, personal contact.

Participation, when properly organized, is the basic democratic method to secure interest and allegiance of individuals within an organization. A joint acknowledgment of the need to communicate, it provides a voluntary basis of collaboration and channel for the much needed encouragement of individual creativity.

Creativity, one of the dominant human drives, must be recognized as such and given administrative encouragement. This is a vital ethical assignment, admittedly difficult to fulfill in modern society, and yet an ethical end to strive for.

Representation highlights those many occasions when the practice of pure democracy may be not only impractical but even undesirable. Ethically, several groups within an organization have both the right and the responsibility to voice their different views in a representative way when common policies and problems are under discussion.

Negotiation stems from the very nature of the relationship between the individual and the organization. The ethical imperative of the collective bargaining process is being recognized increasingly. It necessarily entails an approximate equality of bargaining power between the managers and the managed, and also periodical reviews of the negotiative process to assure continued attainment of this equality.

Consent of the governed is integral to the democratic purpose. This consent may vary from "antagonistic cooperation" to passive consent, uninformed and nominal consent, and finally "the true consent of knowledgeable participation in relevant decisions with a positive and understanding concurrence in the matter at issue." Ethically required, such an informed consent is the cornerstone of any well-managed organization.

The ethical challenge of modern administration brings into focus the reality of what is known as conflicts of interest. Such conflicts are inescapable, Mr. Tead points out, and may even become creative; if confronted honestly, they may lead to a fruitful reconciliation of outwardly discordant interests. The temptation for an executive leader to believe that "father knows best" what is good for his "big happy family" is likely to short-change the democratic process by its very failure to bring into the open the un-

avoidable conflicts of interest. The larger the organization, the more imperative it becomes for the administrator to heed the mandates of democratic consultation.

Mr. Tead states his case for "cultivating ethical sensitivity" by modern administrators. He pleads for a full grasp of ethical complexities involved in modern management; for an awareness of and eagerness to use democratic methods; for a wholesome respect of the individual; for a consciousness of a moral mandate. Stressing the value of a proper educational training, Mr. Tead claims that "initial aptitude, humility of outlook, conscious self-cultivation—these are stronger assets than the popular 'executive development courses' which constitute a strong movement in corporate business management today."

If all this sounds like a large order indeed, the reward is also great "in terms of finer personality, greater productivity, improved social harmony, and democratic consistency. The reward has to do with self-actualization, with the rightful personal freedoms and the creative opportunities opened by administration at all levels of complexity."

("The Ethical Challenge of Modern Administration," by Ordway Tead, in *Advanced Management*, October, 1960, 74 Fifth Avenue, New York 11, N.Y., \$1.00.)



Political Development in Underdeveloped Countries

THE FORMATION of a study group to consider aspects of U.S. foreign policy related to "Political Development in the Underdeveloped Countries," was recently announced by the Brookings Institution. The group of 16 individuals, drawn from both government and private life, will hold a series of meetings aimed at helping to improve communication between governmental and nongovernmental specialists concerning those aspects of U.S. foreign policy that relate to the development of political concepts, institutions, and processes in the emerging countries.

Recent events demonstrate that these factors can be of fundamental importance in affecting the general advancement of these areas, the announcement points out. "Yet American policy makers have tended to give relatively less attention to means of assisting these countries in strengthening their political systems than to more strictly economic questions."

Topics that will be given special attention during the meetings include: U.S. and Soviet theory and practice regarding political development, political trends in selected countries in Asia, Africa, and Latin America, and the direction of future U.S. objectives and activities in this field.

Theodore Geiger, chief of NPA's International Studies section, is a member of the group.

South of the Sahara

THE INCREASING IMPORTANCE to the United States of the newly independent and soon to be independent nations of Africa south of the Sahara makes it desirable that Americans learn a great deal more than they now know about that vast continent and its approximately 160 million people. Two new books help substantially to fill this need—the first for the development specialist, the second for the more general reader.

Agriculture and Ecology in Africa is the result of a lifetime of professional study and research by Dr. John Phillips, Professor of Agriculture at the University College of Ghana. A South African by birth, Dr. Phillips is by training and experience a forester, conservationist, agriculturist, and ecologist. His new book is a comprehensive survey of the latest data on and insights into the physical and environmental aspects of agriculture, including animal husbandry and forestry, in Africa south of the Sahara. As such, it will be an invaluable handbook for those working on the economic and social problems of African development. Government officials in African countries and in the United States, as well as businessmen and social scientists concerned with African economic development, generally know far too little about the potentialities and limitations of the natural environment in Africa. In Dr. Phillips' book, they will find the information derived from the physical sciences and agricultural technology required to make economic development planning, both governmental and private, more effective.

In *Tropical Africa*, Dr. George H. T. Kimble, Chairman of the Department of Geography at Indiana University, has prepared for The Twentieth Century Fund the best comprehensive and detailed introduction to contemporary Africa available in English for the beginning student and the general reader. All major aspects of tropical Africa—defined as the region south of the Sahara and north of the Union of South Africa—are covered in Dr. Kimble's study: physical geography, population composition and trends, economic and social life, political history and contemporary government and politics, education and social services, and existing problems and prospects for the future. Moreover, Dr. Kimble is a brilliant writer, who not only avoids all technical jargon but knows how to make even statistical data interesting. Beautifully illustrated, and with plenty of maps and charts, these two volumes will go a long way toward filling the need for a better understanding among Americans generally of one of the world's most complex and fascinating areas.

—Theodore Geiger

(*Agriculture and Ecology in Africa*, by John Phillips, Published by Frederick A. Praeger, Inc., New York: 1960, 424 pp., map, \$13.50. *Tropical Africa*, by George H. T. Kimble, published by The Twentieth Century Fund, New York: November 1960; Vol. I, "Land and Livelihood," 603 pp., illustrated, map; Vol. II, "Society and Polity," 506 pp., illustrated; two volumes, \$15.00.)

The Research Revolution

THE DRAMATIC DEVELOPMENTS in research and technology of recent decades and their likely effect on future economic growth are dealt with by Leonard S. Silk in *The Research Revolution*. The importance of research for economic growth is demonstrated by calculations which show that about 90 percent of the increase in productivity is attributable to advances in technology, the art of management, and labor skills, while only 10 percent is attributable to the quantitative increase of capital per worker. The spectacular increase in the research effort (1959 outlays measured in constant research dollars were about 30 times as large as those in 1930) makes it likely that a growing volume of research results will find productive application in business.

Silk's book, however, deals not only with the quantitative relationship between research and economic growth. He gives a graphic picture of the way research is translated into industrywide innovations, using the story of the transition as a case study. He reaches a conclusion significant for business and policy makers that "expenditure by business on research and the policies of firms regarding the replacement of obsolescent equipment should come to be regarded as even more important than the rate of investment" (p. 155). W. Leontief states in an introduction to the book that under present institutional arrangements the "practical application of many of the path-breaking discoveries of recent years is necessarily restricted. In an era in which economic progress depends so much on scientific research, such chronic underemployment of technical knowledge might have, in the long run, an even more deleterious effect on the rate of economic growth than idle capital or unemployed labor" (p. 8). Policies which could promote the wider and faster application of the results of research, however, are not spelled out in the book.

—Gerhard Colm

(*The Research Revolution*, by Leonard S. Silk, McGraw-Hill Book Co., Inc., New York: Oct. 1960, x and 244 pp., \$4.95.)

Market Research on a European Scale

MORE THAN 100 experts from 16 European countries met in Paris in 1959 to consider how market research, which is essentially national, could in the future be applied in the larger geographical contexts now coming into being and what steps could be taken to facilitate this movement. The conference was organized by the European Productivity Agency in liaison with the International Chamber of Commerce and the European Society for Opinion Survey and Market Research (ESOMAR).

The proceedings of the conference have recently been published by the Organization for European Economic

Cooperation in a 136-page report entitled *Market Research on a European Scale*. A selection of the papers presented at the conference, a summary of the most important points discussed, and the recommendations adopted are included in the report.

The European market has not yet come into being, but a number of self-contained markets will merge to an increasing extent, the report points out. But any firm which proposes to tackle European markets now and in the coming years must continue to study competition, distribution channels, and consumers against a legal background that differs from country to country because coordination of legislation is only a long-term possibility.

(*Market Research on a European Scale*, published by the Organization for European Economic Cooperation, Paris: June 1960, 136 pp., \$2.00.)

U.S.-Canadian Trade

A DETAILED STUDY of U.S.-Canadian negotiations under the Reciprocal Trade Agreements Program, released this month by the Canadian-American Committee, brings together for the first time the history of tariff and trade negotiations between the two countries since 1934 when the Trade Agreements Act was passed.

Canada and the United States are each other's principal customer and principal supplier; the trade involved is the largest between any two countries of the world. Over the past 26 years, the United States has negotiated many times with Canada, both bilaterally and under the General Agreement on Tariffs and Trade.

The study, in assessing the results of past negotiations, reveals that encouraging progress in U.S.-Canadian trade liberalization has been made. Each country's level of duty on the other's products fell sharply and the climate of their commercial-policy relations changed from hostility to cordial cooperation. In the last decade, however, the liberalizing process has slowed down. To speak only of the United States, we have imposed protective import quotas harmful to Canada and other countries on which we lean for support in the cold war. Our trade-agreement negotiation machinery has become so cumbersome that granting really effective concessions is not procedurally easy. Congress has recently delegated authority to the President to increase duties on numerous important products by many times their present rates. But the outlook for resumed liberalization is not necessarily bleak. As implied in the study, the time is ripe for a new look at the impact of the Reciprocal Trade Agreements Program on our economy and our foreign relations.

—F. G. Mason

(*Changes in Trade Restrictions between the United States and Canada*, by Constant Southworth and W. W. Buchanan, Canadian-American Committee sponsored by the National Planning Association [U.S.A.] and the Private Planning Association of Canada: Nov. 1960, x and 65 pp., \$2.00.)

(Continued from page 4)

Suitable bases for this purpose exist and could be made available to the UN by member states.

World Constitution. One is tempted to argue that the development of agreed principles and criteria for the peaceful settlement of international disputes should logically take precedence over the development of police forces. But history shows that law has seldom developed in this way. Rather it has been built up by the accumulation of precedents deriving from ad hoc settlements of specific issues.

The UN is not a perfect instrument, but it is the best we have or are likely to get in the foreseeable future. Our best hope is to give it the tools which would permit it to exert increasing influence in the ad hoc settlement of international disputes. After the nations of the world have had more experience in peaceful ad hoc settlement of international disputes, then they may be able to formulate more clearly the principles on which such settlements should be based.

Conclusions. In summary, I conclude that:

- There is a present and continuing risk of premeditated nuclear attack on the United States.
- Reduction of the vulnerability of present U.S. strategic forces and creation of less vulnerable deterrent weapons systems are essential.
- There is a steadily increasing risk of nuclear war by accident or miscalculation, which will increase rapidly as more nations get nuclear weapons.
- Graduated reduction of nuclear armaments under the most stringent controls attainable is essential to reduce the risk of both premeditated and accidental nuclear war.

—Completely effective inspection and policing of a nuclear arms reduction agreement is not feasible.

—A blast and fallout shelter program is essential in the United States to insure national survival in a nuclear war which may occur despite our best efforts and is also essential to reduce to tolerable levels the risk from an imperfectly policed arms control agreement.

—The reduction of armaments and the stabilization of mutual deterrence may increase the probability of non-nuclear conflict and thus require strengthening of conventional armaments.

—The need for strengthened conventional armaments should be met to an increasing extent by a permanent international police force under UN control.

—The incremental development of a body of law and of legislative and judicial institutions within the United Nations framework is essential and urgent, but probably must follow the establishment of a UN police force.

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